

Amendments to the Claims

This listing of the claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Original): An aqueous composition comprising:
 - (A) at least one water-soluble component comprising at least one functional group that undergoes a crosslinking reaction;
 - (B) at least one film-forming polymer; and
 - (C) at least one component which provides at least one of moisture barrier properties and/or vapor barrier properties greater than that provided by a combination of components (A) and (B) alone.
2. (Previously presented): The composition of claim 1 wherein component (A) comprises at least one of acrylamide-based crosslinkable polymers, polyamidoamine-epihalohydrin resins, polyamines, or polyimines.
3. (Original): The composition of claim 2 wherein component (A) comprises acrylamide-based crosslinkable polymers.
4. (Original): The composition of claim 3 wherein component (A) comprises cationic functionalized polyacrylamides.

5. (Previously presented): The composition of claim 2 wherein the functional group of component (A) comprises at least one of epoxy, azetidinium, aldehyde, carboxyl group, acrylate and derivatives thereof, acrylamide and derivatives thereof, or quaternary amine.

6. (Previously presented): The composition of claim 5 wherein the functional group of component (A) comprises at least one of epoxy or azetidinium.

7. (Canceled)

8. (Previously presented) The composition of claim 2 wherein the film-forming polymer comprises at least one polymer derived from at least one monomer comprising at least one of styrene, dimethylstyrene, vinyltoluene, chloroprene, butadiene, ethylene, acrylamide, acrylonitrile, acrolein, methylacrylate, ethylacrylate, acrylic acid, methacrylic acid, methyl methacrylate, n-butyl acrylate, vinylidene chloride, vinyl ester, vinyl chloride, vinyl acetate, acrylated urethane, hydroxyethyl acrylate, dimethylaminoethyleneacrylate, or vinyl acetate.

9. (Previously presented): The composition of claim 2 wherein the film-forming polymer comprises a latex comprising at least one polymer derived from at least one monomer comprising repeating units derived from an alkyl halide having at least one double bond and an alkene, wherein the alkyl halide has from 2 to 12 C atoms, and wherein the alkene has from 2 to 12 C atoms.

10. (Original): The composition of claim 9 wherein the alkyl halide comprises a vinyl halide.

11. (Original): The composition of claim 10 wherein the alkyl halide comprises a vinyl halide and the alkene comprises an olefin.

12-14. (Canceled)

15. (Previously presented): The composition of claim 2 wherein component (C) comprises one of sizing materials, ketene dimers, alkenyl succinic anhydrides, fatty acids, or wax emulsions.

16. (Original): The composition of claim 15 wherein the sizing material is a ketene dimer compound prepared from fatty acids of from 16 to 22 C atoms.

17. (Canceled)

18. (Previously presented): The composition of claim 15 wherein the wax emulsion comprises at least one of slack or microcrystalline wax.

19. (Original): The composition of claim 15 wherein the dry weight ratio of (A) and (B) to (C) is about 99:1 to 1:99.

20. (Canceled)

21. (Previously Presented): The composition of claim 19 wherein the dry weight ratio of (A) and (B) to (C) is about 60:40 to about 30:70.

22. (Original): The composition of claim 15 further comprising a fluoacid.

23. (Original): The composition of claim 19 further comprising a fluoacid.

24. (Original): A substrate coated with a cured composition of claim 1.

25. (Original): A substrate coated with a cured composition of claim 2.

26. (Original): A metal substrate coated with a cured composition of claim 22.

27. (Previously presented): The metal substrate of claim 26, wherein the fluoacid comprises at least one of fluotitanic acid or fluozirconic acid.

28. (Original): The metal substrate of claim 27, wherein the composition has a pH from about 1.5 to about 5.0.

29. (Original): A metal substrate coated with a cured composition of claim 23.

30. (Previously presented): The metal substrate of claim 29, wherein the fluoacid comprises at least one of fluotitanic acid or fluozirconic acid.

31. (Original): The metal substrate of claim 30, wherein the composition has a pH from about 1.5 to about 5.0.

32. (Original): A cellulosic product comprising a cured composition of claim 1.

33. (Original): A cellulosic product comprising a cured composition of claim 2.

34. (Original): A ceiling tile comprising a cured composition of claim 1.

35. (Original): A non-woven product comprising a cured composition of claim 1.

36. (Original): A latex extender comprising a cured composition of claim 1.

37. (Original): A paint comprising a cured composition of claim 1.

38. (Previously presented): The composition of claim 8 wherein component (C) comprises one of sizing materials, ketene dimers, alkenyl succinic anhydrides, fatty acids, or wax emulsions.

39. (Original): The composition of claim 38 wherein the dry weight ratio of (A) and (B) to (C) is about 99:1 to 1:99.

40. (Original): The composition of claim 39, further comprising a fluoacid.

41. (Original): A metal substrate coated with a cured composition of claim 40.
42. (Previously presented): The metal substrate of claim 41, wherein the fluoacid comprises at least one of fluotitanic acid or fluozirconic acid.
43. (Original): The metal substrate of claim 42, wherein the composition has a pH from about 1.5 to about 5.0.
44. (Original): A cellulosic product comprising a cured composition of claim 39.
45. (Original): A latex extender comprising a cured composition of claim 39.
46. (Original): A non-woven product comprising a cured composition of claim 39.
47. (Original): A method of preparing a coated substrate which comprises:
- (1) coating a substrate with a coating composition comprising:
 - (A) at least one water-soluble component comprising at least one functional group that undergoes a crosslinking reaction; (B) at least one film-forming polymer; and (C) at least one component which provides at least one of moisture barrier properties and/or vapor barrier properties greater than that provided by a combination of components (A) and (B) alone; and
 - (2) curing the coating composition on the substrate.
48. (Previously presented): The method of claim 47 wherein component (A) comprises at least one of acrylamide-based crosslinkable polymers, polyamidoamine-epihalohydrin resins, polyamines, or polyimines.
49. (Original): The method of claim 48 wherein component (A) comprises acrylamide-based crosslinkable polymers.

50. (Original): The method of claim 48 wherein component (A) comprises cationic functionalized polyacrylamides.

51. (Previously presented): The method of claim 48 wherein the functional group of component (A) comprises at least one of epoxy, azetidinium, aldehyde, carboxyl group, acrylate and derivatives thereof, acrylamide and derivatives thereof, or quaternary amine.

52. (Previously presented): The method of claim 51 wherein the functional group of component (A) comprises at least one of epoxy or azetidinium.

53. (Canceled)

54. (Previously presented): The method of claim 48 wherein the film-forming polymer comprises at least one polymer derived from at least one monomer comprising at least one of styrene, dimethylstyrene, vinyltoluene, chloroprene, butadiene, ethylene, acrylamide, acrylonitrile, acrolein, methylacrylate, ethylacrylate, acrylic acid, methacrylic acid, methyl methacrylate, n-butyl acrylate, vinylidene chloride, vinyl ester, vinyl chloride, vinyl acetate, acrylated urethane, hydroxyethyl acrylate, dimethylaminoethyleneacrylate, or vinyl acetate.

55. (Previously presented): The method of claim 47 wherein the film-forming polymer comprises a latex comprising at least one polymer derived from at least one monomer comprising repeating units derived from an alkyl halide having at least one double bond and an alkene, wherein the alkyl halide has from 2 to 12 C atoms, and wherein the alkene has from 2 to 12 C atoms.

56. (Original): The method of claim 55 wherein the alkyl halide comprises a vinyl halide and the alkene comprises an olefin.

57. (Canceled)

58. (Previously presented): The method of claim 48 wherein component (C) comprises one of sizing materials, ketene dimers, alkenyl succinic anhydrides, fatty acids, or wax emulsions.

59. (Original): The method of claim 58 wherein the sizing material is a ketene dimer compound prepared from fatty acids having C₁₆ to C₂₂.

60. (Original): The method of claim 58 wherein the dry weight ratio of (A) and (B) to (C) is about 99:1 to 1:99.

61. (Original): The method of claim 60 wherein the dry weight ratio of (A) and (B) to (C) is about 60:40 to 30:70.

62. (Original): The method of claim 58 further comprising a fluoacid.

63. (Original): The method of claim 60 further comprising a fluoacid.

64. (Original): A metal substrate prepared by the method of claim 62.

65. (Previously presented): The metal substrate of claim 64, wherein the fluoacid comprises at least one of fluotitanic acid ~~and~~ or fluozirconic acid.

66. (Original): The metal substrate of claim 65 wherein the composition has a pH from about 1.5 to about 5.0.

67. (Original): A metal substrate prepared by the method of claim 63.

68. (Previously presented): The metal substrate of claim 67, wherein the fluoacid comprises at least one of fluotitanic acid and fluozirconic acid.

69. (Original): The metal substrate of claim 68, wherein the composition has a pH from about 1.5 to about 5.0.

70. (Previously presented): The method of claim 50 wherein the film-forming polymer comprises at least one polymer derived from monomers of alkyl halides of from 2-12 C atoms, alkene halides of from 2-12 C atoms, alkyl acrylamides of from 2-12 C atoms, alkene acrylamides of from 2-12 C atoms, alkyl acrylates of from 2-12 C atoms, or alkene acrylates of from 2-12 C atoms.

71. (Previously presented): The method of claim 70 wherein component (C) comprises one of sizing materials, ketene dimers, alkenyl succinic anhydrides, fatty acids, or wax emulsions.

72-76. (Canceled)

77. (Currently Amended): A method of preparing cellulosic products which comprises:

(1)——substantially simultaneously or sequentially adding a composition to a system comprising a cellulosic fibers slurry or suspension,

~~wherein the system comprises at least one of aqueous system, felt, web, or combinations thereof,~~

the composition comprising:

(A) at least one water-soluble component comprising at least one functional group that undergoes a crosslinking reaction; (B) at least one film-forming polymer; and (C) at least one component which provides at least one of moisture barrier properties and/or vapor barrier properties greater than that provided by a combination of components (A) and (B) alone.

78. (Previously presented): The method of claim 77 wherein component (A) comprises at least one of acrylamide-based crosslinkable polymers, polyamidoamine-epihalohydrin resins, polyamines, or polyimines.

79. (Original): The method of claim 78 wherein component (A) comprises acrylamide-based crosslinkable polymers.

80. (Original): The method of claim 79 wherein component (A) comprises cationic functionalized polyacrylamides.

81. (Previously presented): The method of claim 78 wherein the functional group of component (A) comprises at least one of epoxy, azetidinium, aldehyde, carboxyl group, acrylate and derivatives thereof, acrylamide and derivatives thereof, or quaternary amine.

82. (Previously presented): The method of claim 81 wherein the functional group of component (A) comprises at least one of epoxy or azetidinium.

83. (Canceled)

84. (Previously presented): The method of claim 78 wherein the film-forming polymer comprises at least one polymer derived from at least one monomer comprising at least one of styrene, dimethylstyrene, vinyltoluene, chloroprene, butadiene, ethylene,

acrylamide, acrylonitrile, acrolein, methylacrylate, ethylacrylate, acrylic acid, methacrylic acid, methyl methacrylate, n-butyl acrylate, vinylidene chloride, vinyl ester, vinyl chloride, vinyl acetate, acrylated urethane, hydroxyethyl acrylate, dimethylaminoethyleneacrylate, or vinyl acetate.

85. (Previously presented): The method of claim 78 wherein the film-forming polymer comprises a latex comprising at least one polymer derived from at least one monomer comprising repeating units derived from an alkyl halide having at least one double bond and an alkene, wherein the alkyl halide has from 2 to 12 C atoms, and wherein the alkene has from 2 to 12 C atoms.

86. (Original): The method of claim 85 wherein the alkyl halide comprises a vinyl halide and the alkene comprises an olefin.

87. (Canceled)

88. (Previously presented): The method of claim 78 wherein component (C) comprises one of sizing materials, alkenyl succinic anhydrides, fatty acids, or wax emulsions.

89. (Original): The method of claim 88 wherein the sizing material is a ketene dimer compound prepared from fatty acids of from 16 to 22 C atoms.

90. (Original): The method of claim 88 wherein the dry weight ratio of (A) and (B) to (C) is about 99:1 to 1:99.

91. (Original): The method of claim 90 wherein the dry weight ratio of (A) and (B) to (C) is about 60:40 to 30:70.

92. (Previously presented): The method of claim 80 wherein the film-forming polymer comprises at least one polymer derived from monomers of alkyl halides of from 2-12 C atoms, alkene halides of from 2-12 C atoms, alkyl acrylamides of from 2-12 C atoms, alkene acrylamides of from 2-12 C atoms, alkyl acrylates of from 2-12 C atoms, or alkene acrylates of from 2-12 C atoms.

93. (Previously presented): The method of claim 92 wherein component (C) comprises one of sizing materials, alkenyl succinic anhydrides, fatty acids, or wax emulsions.

94. (Original): The method of claim 92 wherein the dry weight ratio of (A) and (B) to (C) is about 60:40 to 30:70.

95. (Original): A cellulosic product prepared by the method of claim 94.

96. (Previously presented): A ceiling tile prepared by the method of claim 94.

97. (Original): A non-woven product prepared by the method of claim 94.

98. (Original): A method for forming a substantially chromium-free, dried in place conversion coating on a metal surface comprising applying to a metal surface:

(1) an aqueous composition comprising (A) at least one water-soluble component comprising at least one functional group that undergoes a crosslinking reaction; (B) at least one film-forming polymer; and (C) at least one component which provides at least one of moisture barrier properties and/or vapor barrier properties greater than that provided by a combination of components (A) and (B) alone; and

(2) fluoacid,

wherein the amount of the composition in (1) is from about 0.1 to about 90% by weight, and

wherein the amount of fluoacid is from about 0.2 to about 20% by weight.

99. (Original): The method of claim 98 wherein said coating composition is dried in place on surface of said substrate.

100. (Original): The method of claim 98 further comprises rinsing said coating composition from said coated substrate.

101. (Previously presented): The method of claim 98, wherein the fluoacid comprises at least one of fluotitanic acid or fluozirconic acid.

102. (Original): The method of claim 101, wherein the composition has a pH from about 1.5 to about 5.0.

103. (Previously presented): The method of claim 102 wherein component (A) comprises at least one of acrylamide-based crosslinkable polymers, polyamidoamine-epihalohydrin resins, polyamines, or polyimines.

104. (Original): The method of claim 103 wherein component (A) comprises acrylamide-based crosslinkable polymers.

105. (Previously presented): The method of claim 103 wherein the functional group of component (A) comprises at least one of epoxy, azetidinium, aldehyde, carboxyl group, acrylate and derivatives thereof, acrylamide and modification thereof, or quaternary amine.

106. (Previously presented): The method of claim 105 wherein the functional group of component (A) comprises at least one of epoxy or azetidinium.

107. (Canceled)

108. (Previously presented): The method of claim 103 wherein the film-forming polymer comprises at least one polymer derived from at least one monomer comprising at least one of styrene, dimethylstyrene, vinyltoluene, chloroprene, butadiene, ethylene, acrylamide, acrylonitrile, acrolein, methylacrylate, ethylacrylate, acrylic acid, methacrylic acid, methyl methacrylate, n-butyl acrylate, vinylidene chloride, vinyl ester, vinyl chloride, vinyl acetate, acrylated urethane, hydroxyethyl acrylate, dimethylaminoethyleneacrylate, or vinyl acetate.

109. (Previously presented): The method of claim 101 wherein the film-forming polymer comprises a latex comprising at least one polymer comprising repeating units derived from an alkyl halide having at least one double bond and an alkene, wherein the alkyl halide has from 2 to 12 C atoms, and wherein the alkene has from 2 to 12 C atoms.

110. (Previously presented): The method of claim 103 wherein component (C) is a polymer comprising one of sizing materials, alkenyl succinic anhydrides, fatty acids, or wax emulsions.

111. (Original): The method of claim 110 wherein the sizing material is a ketene dimer compound prepared from fatty acids of from 16 to 22 C atoms.

112. (Original): The method of claim 110 wherein the dry weight ratio of (A) and (B) to (C) is about 99:1 to 1:99.

113. (Original): The method of claim 112 wherein the dry weight ratio of (A) and (B) to (C) is about 60:40 to 30:70.

- 114. (Original): A metal substrate prepared by the method of claim 98.
- 115. (Original): A metal substrate prepared by the method of claim 103.
- 116. (Canceled)
- 117. (Original): A metal substrate coated by the method of claim 109.
- 118. (Original): A metal substrate coated by the method of claim 112.